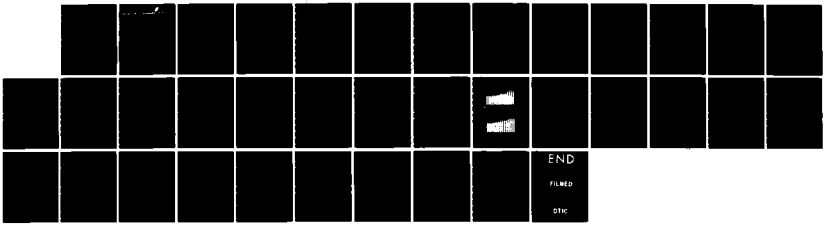
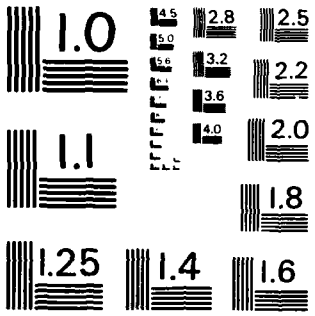
AD-A148 254 MODIFICATIONS OF THE STANDARD BASE SUPPLY SYSTEM STOCK LEVELING TECHNIQUES(U) AIR FORCE LOGISTICS MANAGEMENT CENTER GUNTER AFS AL K B FAULHABER APR 83 1/1

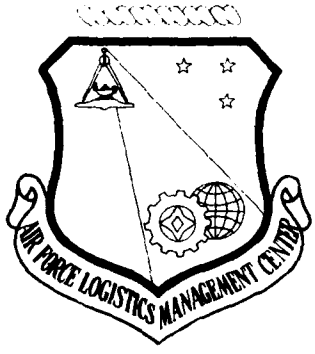
UNCLASSIFIED F/G 15/5 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A

AIR FORCE LOGISTICS MANAGEMENT CENTER



Modifications of the Standard Base Supply System Stock Leveling Techniques

Final Report 161138

April 1983

Major Kenneth B. Faulhaber

AIR FORCE LOGISTICS MANAGEMENT CENTER
GUNTER AFS, AL. 36114

84 . 1 [illegible] 4

Air Force Logistics Management Center

Modifications of the Standard Base Supply System Stock Leveling Techniques

Final Report 161138

April 1983

Major Kenneth B. Faulhaber

Captain Andrew Ogan
Mr Ron Hare
Mr Grady Edwards

Air Force Logistics Management Center
Gunter AFS, Alabama 36114

ABSTRACT

This is an impact analysis of major changes made to the stockage policies of the Air Force Standard Base Supply System in December 1981. These stock leveling techniques changes were required by Department of Defense Directive 4140.44, "Supply Management of the Intermediate and Consumer Levels of Inventory," and the supporting Instruction 4140.45, "Standard Stockage Policy for Consumable Items at the Intermediate and Consumer Levels of Inventory." Existing range of stock computations were replaced by new methodology considering economics of operation as well as demand history. Additionally, existing depth of stock computations were modified. Analysis addressed inventory growth, workload reductions, and mission support statistics. Data indicates that the changes experienced in these areas are at or near the original projections. The new stock leveling techniques should be retained.

EXECUTIVE SUMMARY

The Air Force Logistics Management Center (AFLMC) was tasked in May 1978 by HQ USAF/LEX to develop implementation plans for the requirements of Department of Defense Directive 4140.44 and DOD Instruction 4140.45. The objective was to insure the criteria used to compute the range and depth of stock for consumables at the retail (base) level complied with DOD requirements. Specifically, range of stock computations had to be developed which consider various costs of operation. Also, the depth of stock computations had to be analyzed for modifications or improvements.

The AFLMC developed new cost-driven, range of stock computations and identified a major modification to the existing depth of stock computations. These new stock leveling techniques were presented in an Interim Report entitled, "Modifications of the Standard Base Supply System Stock Leveling Techniques" dated December 1980. The techniques were approved by HQ USAF/LEY, and the Air Force Data System Design Center was tasked to modify the SBSS. In December 1981 the changes were released Air Force-wide. Since then the AFLMC has been tracking various measures of supply performance and inventory investment in an attempt to gauge the impact of these new stock leveling techniques.

The original analysis, as reported in the interim report, predicted various changes in certain supply performance measures and in inventory investment. In this report the actual levels achieved versus those predicted are compared. Both Stockage and Issue Effectiveness rates measure the number of customer requests that are filled from shelf stocks available at base level. Each was predicted to increase by approximately 1 percent. Actually a full 3 percent increase has been experienced. The initial analysis projected

a 20 percent reduction in the number of requisitions for stock replenishment and receipts. A reduction of 10 percent has been achieved to date. The initial analysis also projected significant reductions in mission capability (MICAP) requests for items that resulted in the grounding of major end items such as aircraft, engines, vehicles, etc. These ranged from 13 to 38 percent depending on the type and item. To date a 7 percent reduction in these type requests has been achieved.

The cost of these improvements was projected to be a one-time increase of 7 percent in inventory investment. At the time of the original analysis this equated to approximately $20 million. Since the stock leveling modifications were made in December 1981, the average inventory investment from CY 81 to CY 82 has increased by 21 percent. While this increase initially appeared to be attributed to the December 1981 stock leveling changes, an analysis of the reparable inventory suggests otherwise. The reparable inventory was not impacted by the December 1981 changes and yet this inventory increased by over 19 percent. It is apparent many factors are driving inventories up and the stock leveling modifications were not solely responsible for the increase in inventory investment. These factors included, but were not limited to, increases in the active aircraft fleet and inflation levels higher than budgeted for or projected.

The stock leveling modifications are performing as expected and should be retained. Both supply performance measures and inventory investment are up, while supply workload is decreasing. The costs of the additive inventory investment appear to fall within expectations. It is also recommended that these changes be subjected to refinements if continued stock fund problems persist or if new concepts such as an item essentiality coding technique are developed.

Secondary objectives were added to this effort after the publication of the interim report in December 1980. We were tasked to update the cost factors used within the range and depth of stock computations. Once updated the impact of using these new values was determined to require an additional 6 percent in stock funds. These new cost factor values should be used. Also, a proposal to level on all first-time awaiting parts (AWP) requests was evaluated. This analysis indicated no significant changes in either supply performance or inventory investment. Therefore, leveling on first time AWP requests should not be implemented.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

THE PROBLEM

1-1 BACKGROUND.. In December 1980 we published an interim report presenting new stock leveling techniques for consumable items. These new techniques were approved for Air Force wide implementation by HQ USAF/LEYS. The changes were made by the Air Force Data System Design Center and released on 1 December 1981.

a. The interim report, dated December 1980 (under project number 161138) should be referred to for more detail about these stockage policy changes. A general description is presented below:

(1) Range of stock computations were totally revamped. Previously, the decision to add an item to the range of assets stocked at the retail level was based on the number and priority of historical demands over time. This approach was replaced by a methodology based on economics. Various costs of operation such as order and backorder costs, costs to add and maintain items, and holding costs are considered to determine the total costs involved with stocking or not stocking an asset. These costs are then used to make the most economical stockage decision. This approach was applied to all assets except those that grounded major end items such as aircraft or vehicles. These type assets were stocked after the first such demand without any economic considerations.

(2) Depth of stock computations were modified with the removal of the variable stockage objective (VSO). This VSO served to factor down the computed depth of stock levels based on the historical demand patterns and priorities over time. The VSO was removed from the depth of stock

computations allowing for a full economic order quantity for all items regardless of their demand history.

b. The impacts of these modifications were projected through the use of simulation. The System to Analyze and Simulate Base Supply (SASBS) simulation model was used with actual item records and transactions from two base supply accounts. A full year's worth of data for each base was used with the following results:

(1) Reductions in both receipts and priority group three requisitions approached 20 percent.

(2) Both Issue and Stockage Effectiveness increased by approximately one percent.

(3) Grounding incidents were also tracked with the following results:

GROUNDING INCIDENT	PROJECTED REDUCTION
Non - Mission Capable Aircraft	21%
Partially - Mission Capable Aircraft	38%
Non - Mission Capable Engines	16%
Vehicle Down for Parts	13%

(4) The cost for these projected improvements was determined to be a one-time 7 percent increase in inventory investment. When applied to the actual Air Force inventory investment as of November 1980, this would amount to approximately $20 million.

1-2 PROBLEM STATEMENT

a. An assessment of the impact of the December 1981 changes was needed to see if the anticipated results were realized. This assessment could identify a need to modify the new stockage policies. It could also help to refine our impact projections for future stockage policy changes.

b. Secondary objectives addressed the various cost factors used in the range and depth formulas, and awaiting parts (AWP) requests. Specifically, the cost factors had to be updated, and the impact of the new values on supply performance and support and inventory investment had to be determined. Also, a proposal to bypass the economic analysis of the range computations for AWP requests had to be evaluated. This proposed change would stock assets at the base level after the first AWP demand just as we do for those items grounding major end items.

1-3 FACTORS BEARING ON THE PROBLEMS. There are many factors affecting the Air Force's inventory of consumable spares. They include but are not limited to the following:

a. The introduction of major new end items such as new aircr /ehicle, and communications systems.

b. The influence of inflation and the subsequent ability of s harges to compensate for inflationary price increases.

c. Changes to stockage policies.

d. Fluctuations in the demand for supplies caused by flying hour changes, altered maintenance practices, suppressed new system procurement, etc.

e. Funding shortfalls and the resulting management practices necessary to keep underfunded programs and functions operating.

CHAPTER 2

ANALYSIS

2-1 APPROACH.

a. The first step in this analysis was to quantify the changes that actually occurred in those data elements for which initial projections were made. These were inventory investment, the number of receipts and requisitions, stockage and issue effectiveness, and aircraft/vehicle/engine grounding incidents. All data was obtained from the Monthly Base Supply Management Report (M32) after consolidation by the Air Force Data System Design Center (AFDSDC). The data was averaged by quarter from the second quarter of calendar year 1979 through the fourth quarter of calendar year 1982. Since December 1982 data was not yet available the months of October and November 1982 were used to devise a fourth quarter average for calender year 1982.

b. Reparable data was also analyzed in an attempt to identify those changes in the EOQ inventory that might be attributed to the 1 December 1981 stockage policy modifications. Since the reparable inventory was not directly affected by these stockage policy changes, it was used in an attempt to isolate comparable changes in the EOQ inventory. For instance, if the number of item records for both EOQ and reparable items increased, then this increase in EOQ inventory might not be attributed to the stockage policy changes alone since the reparable inventory also increased. Therefore, data presented throughout this report will be depicted for both EOQ and reparable inventories.

c. Finally, the cost factors were updated and their impact on inventory

growth and supply support were projected. Applying the first-time leveling criteria to AWP requests was also analyzed.

2-2 RESULTS. An analysis of available data strongly indicates that the changes predicted in the interim report have been experienced. Reductions in supply workload were projected with decreases approaching 20 percent for both receipts and requisitions. Reductions were also projected for MICAP incidents. Increases in inventory investment and fill rates were also predicted. Each of these projections have been achieved to some degree and in some cases even exceeded. An analysis of each of these areas is presented below.

a. Growth in Inventory Investment.

(1) The interim report predicted a one-time increase in inventory investment of 7 percent that equated to $19.5 million. This was based on the dollar value of the Air Force total demand level for EOQ assets at the end of October 1980, $279 million. By the time the modifications were implemented in December 1981 this figure had grown to $298 million. A 7 percent increase based on this new figure equals $20.8 million. Since the modifications were implemented, the dollar value of the demand level for EOQ assets has grown from $298 million to $376 million. Figure 1 depicts this inventory growth. This represents a 26.1 percent growth in inventory of $78 million.

(2) A statistical analysis of the data in Figure 1 was conducted. Using the data from March 1981 through December 1981, trend lines were fitted using regression analysis. This approach was used to predict the EOQ Dollar Value of Demand Level for the months January 1982 through November 1982. These predicted values were compared to the actual values experienced to determine whether significant increases appeared after the December 1981 stock

leveling modifications. The results, given in Table One, do not support a conclusion that these stock leveling modifications significantly increased the Dollar Value of Demand Level for EOQ assets beyond the level originally projected.

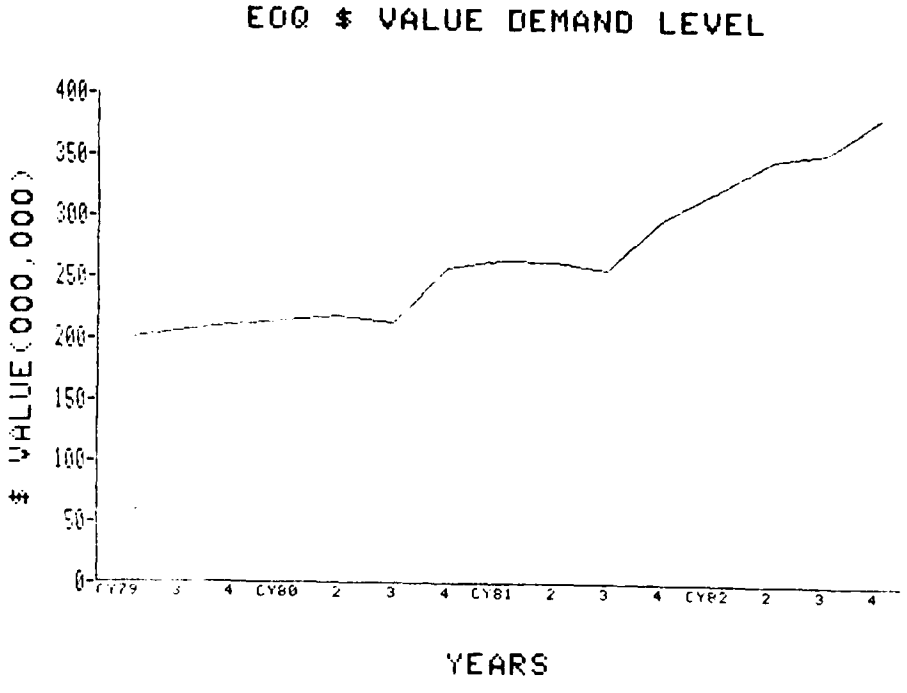


Figure 1

MONTH	PREDICTED VALUE	ACTUAL VALUE	DIFFERENCE
JAN 82	$300	$316	$ +16
FEB	305	332	+27
MAR	310	317	+ 7
APR	315	336	+21
MAY	320	346	+26
JUN	325	360	+35
JUL	330	357	+27
AUG	335	342	+ 7
SEP	340	365	+25
OCT	345	390	+45
NOV	350	376	+26
		Average Difference	$ 23.8

TABLE 1

Dollar Value Comparison: Predicted vs Actual

(all amounts shown are in $ million)

The average monthly difference of a $23.8 million increase is extremely close to the $20.8 million that had been originally predicted as a cost of making these changes.

(3) At this point, the dollar value of the reparable item demand levels was examined. While these items were not affected by the stockage policy changes they also experienced a substantial growth during Calendar Year 1982. During this time frame this inventory grew from $1.39 to $1.66 billion. This represents a 19.4 percent growth in inventory investment for reparable items. Figure 2 depicts this inventory growth.

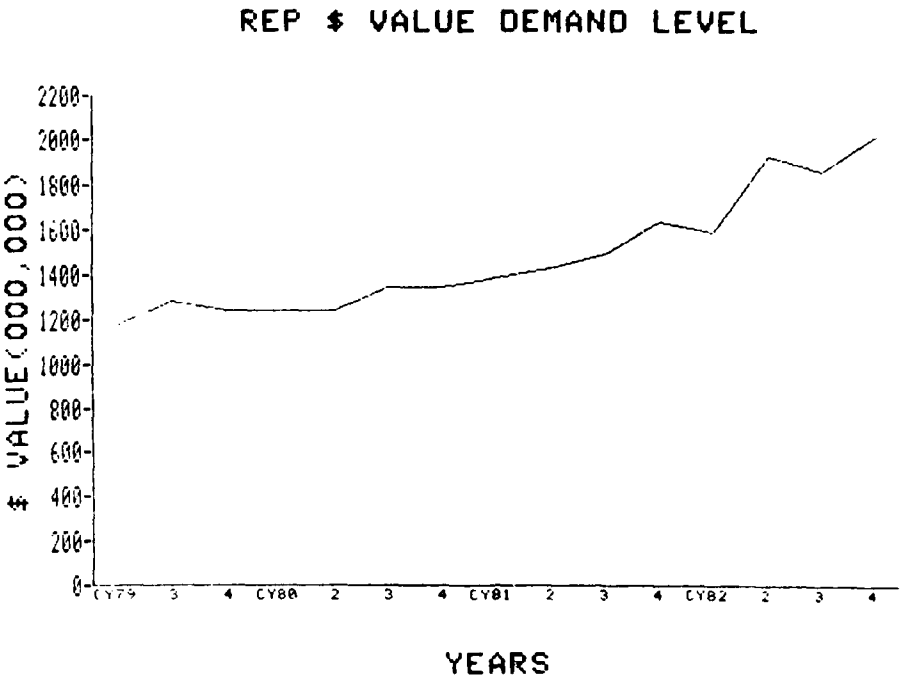


Figure 2

This growth in the reparable inventory is comparable to the percentage increase for EOQ assets and in fact exceeded it when the EOQ was reduced by the projected 7 percent. This strongly indicates that other factors besides the stockage policy changes were driving inventory growth.

(4) Next, the number of item records for both EOQ and reparable assets was reviewed. Figure 3 depicts the EOQ data.

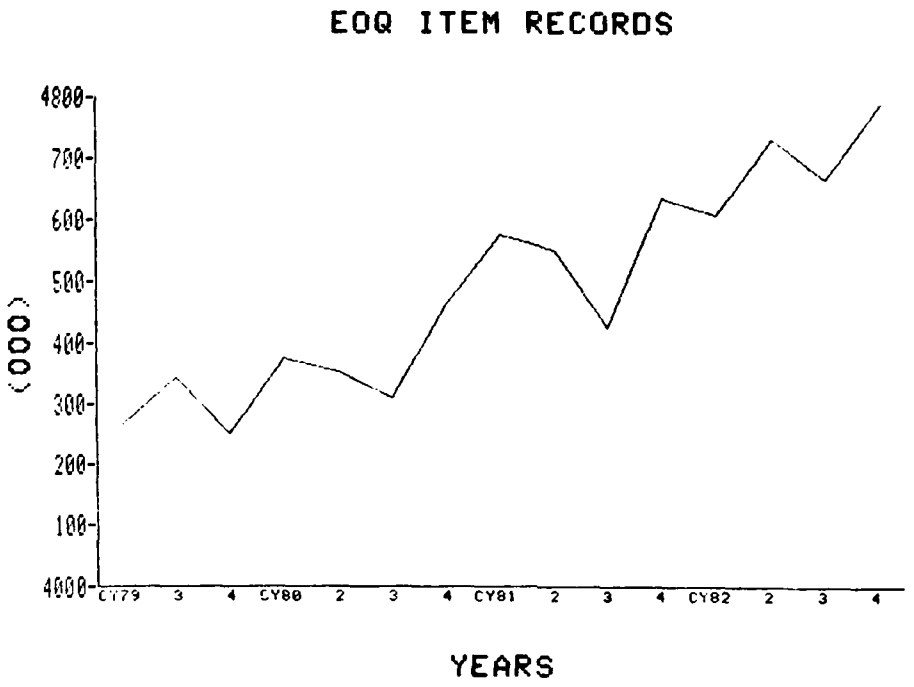


Figure 3

The number of EOQ item records increased from 4.62 to 4.75 million for only a 2.8 percent increase during Calender Year 1982. During the same time reparable item records increased from 617,000 to 670,000 for an increase of 8.6 percent. Figure 4 indicates this growth.

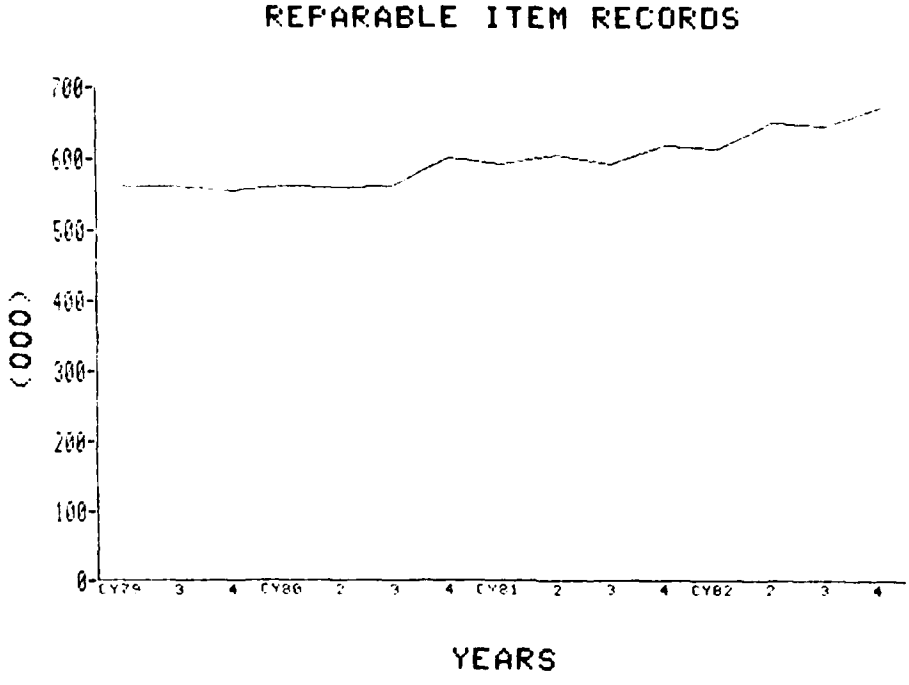


Figure 4

While some growth has been experienced in the number of items in both the EOQ and reparable inventories, this alone does not adequately explain the large increases in the total dollar value of the demand levels.

(5) One final category of data in this inventory investment area was examined. The average dollar value per item record was determined using the data elements already presented. This data was viewed as an indicator of any changes in the cost of items. It should be noted that it might also reflect changes in the computed stock or demand levels themselves. Figures 5 and 6 represent this data for EOQ and reparable assets, respectively.

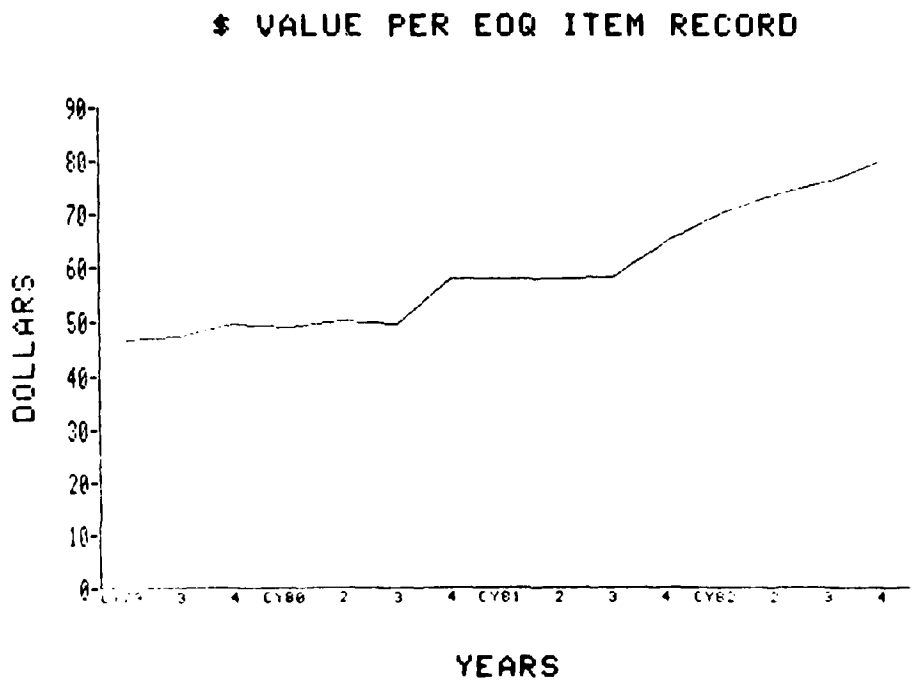


Figure 5

Figure 6

During Calendar Year 1982 these values increased by 24 percent for the EOQ inventory and 16.1 percent for the reparable inventory. Since there were no major stockage policy changes for the reparable inventory that would cause demand levels to change, this increase can be attributed, at least in part, to the impact of inflation.

(6) The inflation experienced from CY 79 through CY 81 was reviewed. Table Two reflects this data along with the Surcharge Price Stabilization Factor applied to the stock fund to compensate for inflation. The resulting shortfalls are also shown.

YEAR	CONSUMER PRICE INDEX	SURCHARGE PRICE STABILIZATION FACTOR	SHORTFALL
1979	10.3%	3.0%	7.3%
1980	13.6%	4.3%	9.3%
1981	11.1%	10.0%	1.1%

Table 2

Inflation and Surcharge Rates

These shortfalls were absorbed by the stock fund as increases not budgeted for or anticipated.

(7) These inflation figures were then used to project out each inventory. For example, the CY 79 inflation of 10.3 percent was applied against the inventory for that year to project the inventory for CY 80. The same was done for CY 81 and CY 82. These projections and the actual levels experienced are depicted in Figures 7 and 8 for EOQ and reparables, respectively.

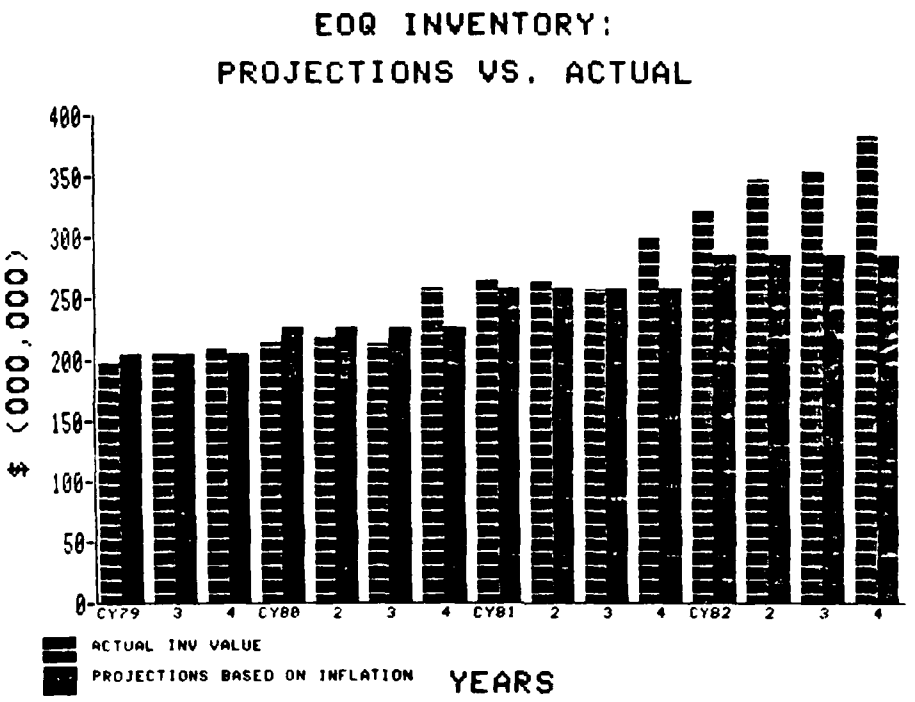


Figure 7

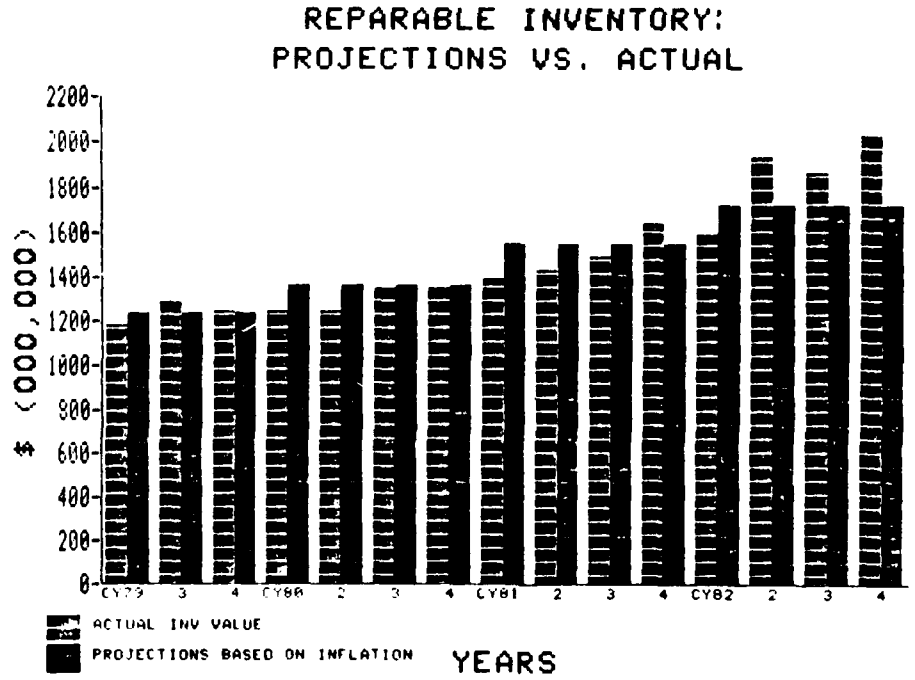


Figure 8

The difference between the actual and the projected inventory value amounts to 17 percent or $66.5 million for EOQ items and 8 percent or $136 million for the reparable inventory. If the 7 percent increase, projected as a result of the stockage policy changes for the EOQ inventory, is taken into consideration, the actual increase over that projected by inflation equals 10 percent. This is very comparable to the 8 percent inventory growth experienced with the reparable items.

(8) Another factor affecting the growth of both EOQ and reparable inventories is the changes in the size of our vehicle and aircraft inventories. During the late 1970s the purchase of new general purpose vehicles was suppressed. The release of this pent up demand in the 1980s may have affected our inventories. Also, the continuous introduction of newer weapon systems (F-16, F-15, A-10, etc.) impacts the dollar value of our inventories. Older systems have not been transitioned out of the system at the same rate the new aircraft have been introduced. The Air Force Summary shows that the active aircraft inventory has grown from 8,959 in 1979 to 9,271 in 1982 for a 5.7 percent increase.

b. Receipts and Requisitions.

(1) Our initial analysis projected almost a 20 percent decrease in both receipts and Priority Group Three stock replenishment requisitions. Figure 9 shows the average monthly receipts by quarter. A definite pattern is discernable with peaks occurring at the second quarter followed by a downward trend until the beginning of the next calender year when the number of receipts again begin to increase.

Figure 9

This trend changes for CY 82 with the peak occurring in the first quarter followed by a continuous downward trend. The movement of the peak from the second to the first quarter could be explained by the removal of the Variable Stockage Objective (VSO) from the depth of stock computations. The initial impact of this change would be fewer requisitions (and the resulting receipts) but for larger quantities. And these requisitions would occur sooner in the reorder cycle. Hence the movement of the peak in receipts to the first quarter of CY 82. The true test as to whether or not receipts will actually be reduced will come with the first quarter of CY 83 data. If this data fails to show the magnitude of the previous cyclical increases or continues to decrease then the projected reductions will be fully realized.

(2) While the data for the Priority Group Three stock replenishment requisitions does not demonstrate the seasonal trends of the receipts, reductions are evident in *Figure 10*.

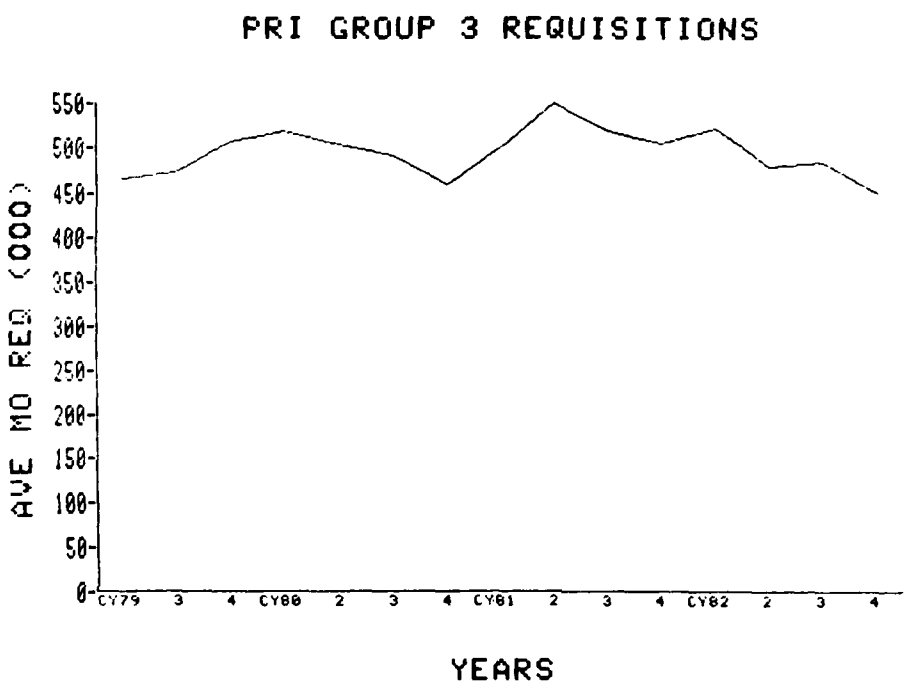


Figure 10

Overall, for CY 82, reductions in receipts and requisitions amount to approximately 10 percent.

c. Stockage and Issue Effectiveness.

(1) While the reductions experienced for receipts and requisitions have yet to reach the projected figures, the improvements in Stockage and Issue Effectiveness have exceeded projections. Stockage Effectiveness rates for both EOQ and reparables are shown in Figure 11.

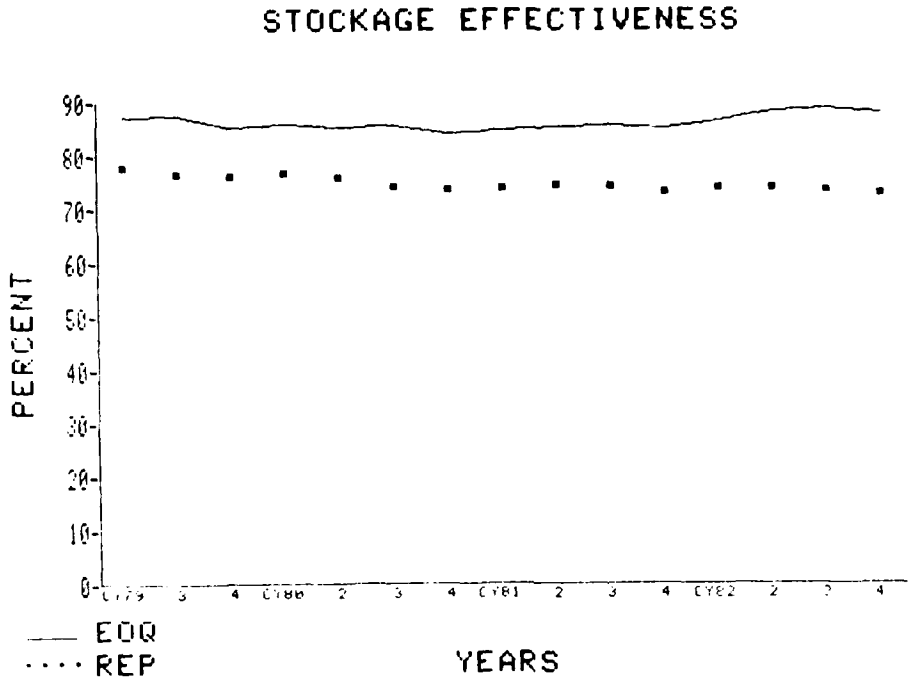


Figure 11

The rates for reparables have remained fairly constant with a slight downward trend. While we had projected a 1 percent increase for EOQ Stockage Effectiveness, in fact nearly a 3 percent increase has been achieved. The average for CY 81 was 85.0 percent as compared to 87.7 percent for CY 82.

(2) Similar data is reflected in Figure 12 for Issue Effectiveness with one striking difference. Prior to CY 82 the reparable inventory has always achieved higher rates than the EOQ inventory. However, with the second quarter of CY 82 the EOQ rate exceeded that of the reparables. This relationship has held for the remainder of CY 82.

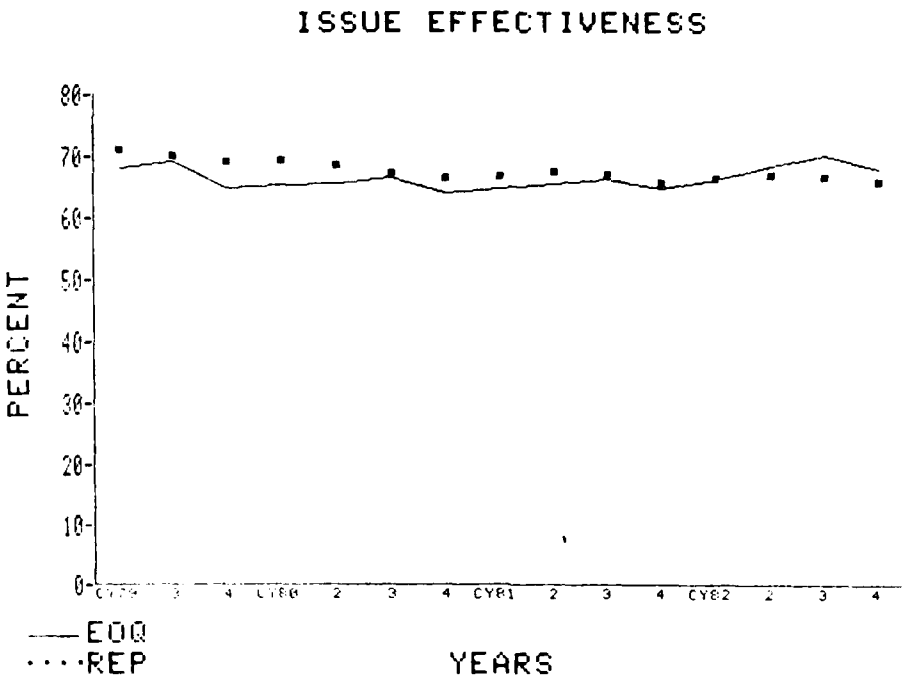


Figure 12

As with the Stockage Effectiveness rates the reparable data has basically held constant with a slight downward trend. The EOQ rates have increased a full 3 percent. The average EOQ Issue Effectiveness for CY 81 was 65.3 percent as compared to 68.3 percent for CY 82.

d. Mission Capability (MICAP) Rates.

(1) A major modification of the recently adopted stockage policies concerned those assets that grounded aircraft, vehicles, communications equipment and other major end items. Previously it took three such grounding or MICAP incidents or demands before an asset would be stocked at base level. The criteria adopted from the interim report establishes a stock level after only one such grounding incident or demand. The simulation model tracked both non-mission and partially mission capable aircraft as well as aircraft engines

and vehicles down for parts. Simulation analysis indicated significant reductions ranging from 13 to 38 percent depending on the major end items involved. Recognizing the inherent limitations of simulation analysis, this magnitude of reduction in incidents was not anticipated. However, confidence was high that some level of reduction would definitely be experienced. It should be noted that this was considered the critical performance measure since effectiveness rates and reductions in supply workload (receipts/ requisitions) do not relate directly to operational aircraft on primary mission support. Figure 13 presents EOQ MICAP rates derived by dividing total MICAP incidents by total EOQ requests. This data reflects an approximate reduction of 7 percent from CY 81 to CY 82.

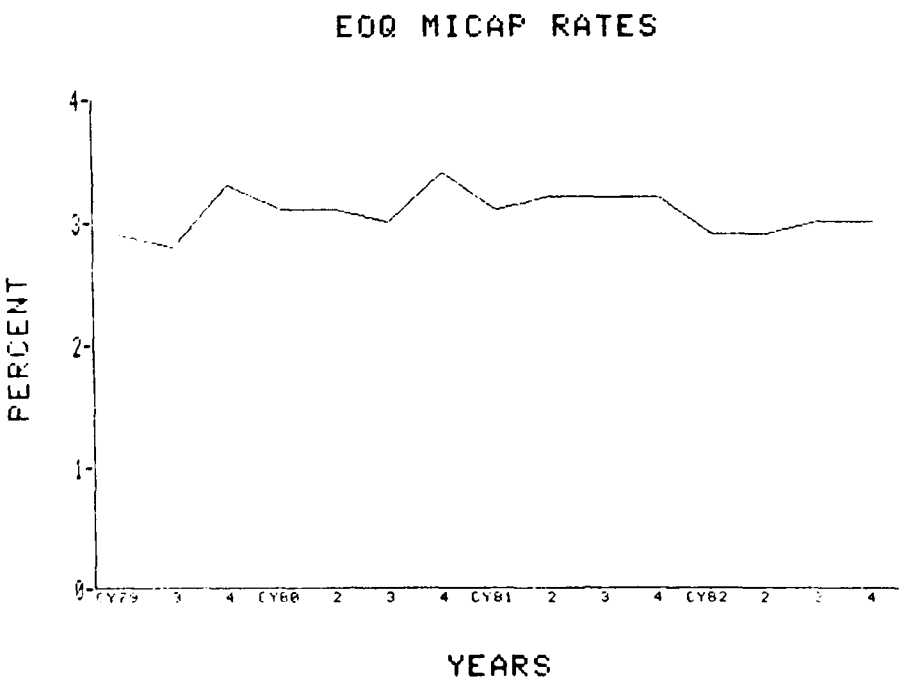


Figure 13

(2) As with other data categories reparable data was also reviewed for comparison. Figure 14 reflects reparable MICAP rates.

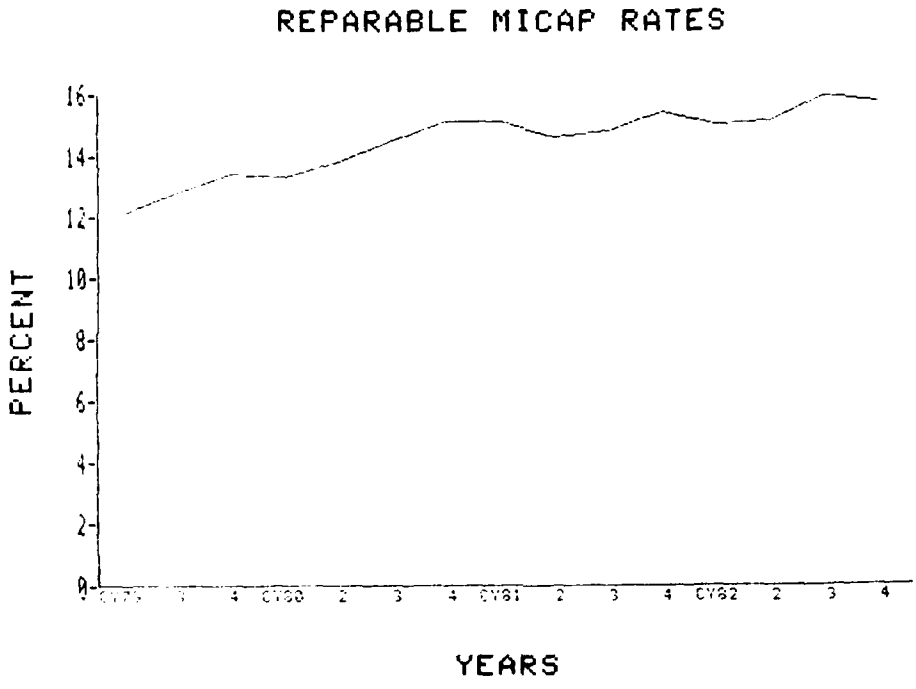


Figure 14

A general upward trend in these rates has continued through CY 82.

(3) MICAP Cause Code B incidents were also examined. These incidents represent aircraft grounding incidents for items demanded previously but not stocked at the base level. By leveling on the first MICAP demand instead of the third, these Cause Code b incidents should have been reduced. Figure 15 supports this depicting a reduction from 25 percent for CY81 to 13 percent at the end of CY82. This data strongly suggests that the new range of stock computations are reducing the number of aircraft and vehicle grounding incidents. (NOTE: Reparable data for the same time frame has remained constant around 9 percent.)

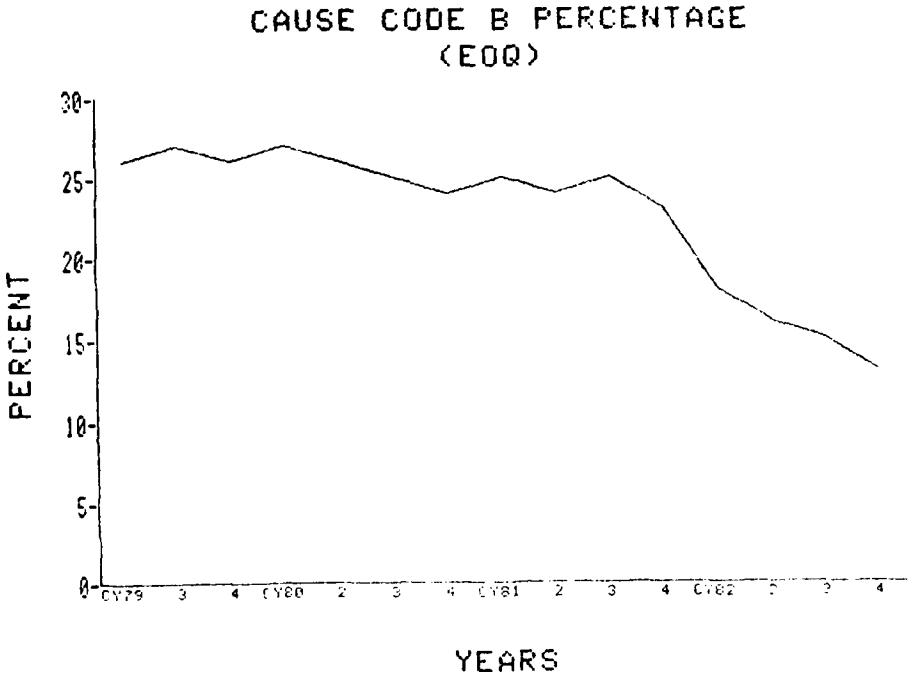


Figure 15

e. Updated Cost Factors.

(1) The cost factor values currently being used are shown in Table 3 below along with the new values developed through this effort.

FACTOR	CURRENT VALUE	NEW VALUE
Holding Cost Rate	26%	15%
Cost to Order (Non LP)	$ 4.54	$ 5.20
Local Purchase (LP) Cost to Order	$15.84	$19.94
Backorder Cost	$ 2.55	$ 3.60
End-Use Order Cost	$ 6.47	$ 8.38
Cost to Add	$ 3.38	$ 5.54
Cost to Maintain	$11.20	$15.98

Table 3

Current and New Cost Factor Values

These values were originally developed and subsequently updated using a task driven approach. All tasks associated with these costs of operation were

identified and then the cost to perform each task was developed. All original reports are available at the Air Force Logistics Management Center and were listed in the Interim Report, dated December 1980. The documentation supporting the new values is also available at the Center.

(2) To determine the impact of implementing these new cost factor values, the System to Analyze and Stimulate Base Supply (SASBS) simulation model was used. The SASBS was also used in the original analysis to develop and project the impact of the new stockage policy changes. The results of these simulation runs indicate an overall increase of approximately 6 percent of on-hand inventory investment. Some slight increases in Stockage and Issue Effectiveness were indicated.

e. Awaiting Parts Requests. The SASBS was also used to evaluate a first time leveling criteria for AWP requests as we currently do for MICAP requests. The model was modified so that first time awaiting parts requests resulted in a stockage decision. The results of simulation runs against this modification were inconclusive. Neither inventory investment figures or the measures of supply performance changed significantly.

CHAPTER 3

CONCLUSIONS

3-1 Inventory Growth

The data presented in this report shows a substantial growth in the dollar value for both the EOQ and reparable inventory demand levels. Consequently, not all of the EOQ inventory growth can be attributed to the new stock leveling techniques. It is obvious that many factors are affecting the growth of both inventories. The impact of any one factor such as stock leveling technique modifications or increases in the active aircraft fleet can not be singled out. The data presented indicates, however, that the stockage policy changes implemented in December 1981 have not cost significantly more than projected.

3-2 Supply Performance and Workload Reductions.

Both supply performance and workload have moved in the direction predicted by the original analysis. The increase in supply effectiveness rates have exceeded projections. While reductions of 7 percent have been experienced for EOQ MICAP incidents, these are not of the magnitude projected. Finally, only a 10 percent reduction in receipts and requisitions has been achieved while a level of almost 20 percent had been predicted.

3-3 Cost Factor Update/Analysis

The projected impact of implementing the updated cost factor values listed in Table 3 is a 6 percent increase in inventory investment. Experience with the original modifications, presented and analyzed by this effort, suggest that this actual level of change will probably not be achieved. However, this experience also indicates that while this magnitude of change might not be

achieved in fact, the direction of change can be anticipated with a strong degree of confidence.

3-4 Awaiting Parts Requests

Applying a first demand leveling criteria to AWP requests did not reveal any major changes or impact using the SASBS simulation model. The model output data of supply performance measures and inventory investment reflected insignificant changes. Apparently, most AWP assets within the sample data had levels established but of insufficient depth to meet AWP demands. Therefore, the changes in the range of stock computations had little impact on the AWP items within the sample data base.

CHAPTER 4

RECOMMENDATIONS

4-1 E(X) Stock Leveling Modifications

The modifications have yielded the anticipated results and should be retained. Both inventory investment and performance are up while workload has been reduced and mission support improved. The basic changes appear to be functioning as designed. Further refinements to the stockage formulas might be explored. Approval of an item essentiality coding technique or continuing stock fund problems might dictate a change to some of the formula's factor values. Finally, even though a full year's worth of data has now been analyzed, recommend we continue to review this data. This is necessary to see if trends experienced in all areas will hold.

4-2 Updated Cost Factors

Recommend that the new cost factor values be implemented. However, prior to implementation, further runs with the SASBS simulation model should be made with as many bases from the Air Force Supply Data Bank as possible. This is considered essential in order to more accurately predict the actual impact of the new values on inventory investment. At the time of this analysis only two bases were used. Running the simulation model with data from eight bases (available shortly) will further refine the predicted outcomes of implementation. The AFLMC is prepared to conduct this analysis.

4-3 Awaiting Parts Requests

There appears to be little to be gained from applying the first time leveling criteria to AWP assets.

DISTRIBUTION LIST

HQ AAC/LGS
Elmendorf AFB, AK 99506

USAF Academy/LGS
USAFA, CO 80840

HQ AFAFC/XSM
3800 York Street
Denver, CO 80205

HQ AFISC/IGB
Norton AFB, CA 92409

HQ AFLC/LOL/LOR/XRSC
Wright Patterson AFB, OH 45433

HQ AFRES/LGS
Robins AFB, GA 31098

HQ AFSC/LGS
Andrews AFB, MD 20334

HQ AFTEC/LGS
Kirtland AFB, NM 87117

HQ ATC/LGS
Randolph AFB, TX 78150

HQ MAC/LGS
Scott AFB, IL 62225

HQ NGB/LGS
Washington DC 20331

HQ PACAF/LGS
Hickam AFB, HI 96853

HQ AFCC/LGS
Scott AFB, IL 62225

HQ SAC/LGS
Offutt AFB, NE 68113

HQ TAC/LGS
Langley AFB, VA 23665

HQ USAFE/LGS
APO NY 09012

HQ ESC/LGS
San Antonio, TX 78243

HQ USAF/LEYS/LEXY
Washington DC 20330

AFIT/LS
Wright Patterson AFB, OH 45433

AUL
Maxwell AFB, AL 36112

AFHRL/LRS-TDC
Wright Patterson AFB, OH 45433

AFCOLR/CC
Wright Patterson AFB, OH 45433

AFBRMC/CC
Wright Patterson AFB, OH 45433

AFALD/XR
Wright Patterson AFB, OH 45433

AFDSDC/LGS
Gunter AFS, AL 36114

AFLMC/XRS
2 copies & original report

AFLMC Library
5 copies minimum

AFLMC/LGS
1 cy for directorate library

DISTRIBUTION LIST

HQ AAC/LGS
Elmendorf AFB, AK 99506

USAF Academy/LGS
USAFA, CO 80840

HQ AFAFC/XSM
3800 York Street
Denver, CO 80205

HQ AFISC/IGB
Norton AFB, CA 92409

HQ AFLC/LOL/LOR/XRSC
Wright Patterson AFB, OH 45433

HQ AFRES/LGS
Robins AFB, GA 31098

HQ AFSC/LGS
Andrews AFB, MD 20334

HQ AFTEC/LGS
Kirtland AFB, NM 87117

HQ ATC/LGS
Randolph AFB, TX 78150

HQ MAC/LGS
Scott AFB, IL 62225

HQ NGB/LGS
Washington DC 20331

HQ PACAF/LGS
Hickam AFB, HI 96853

HQ AFCC/LGS
Scott AFB, IL 62225

HQ SAC/LGS
Offutt AFB, NE 68113

HQ TAC/LGS
Langley AFB, VA 23665

HQ USAFE/LGS
APO NY 09012

HQ ESC/LGS
San Antonio, TX 78243

HQ USAF/LEYS/LEXY
Washington DC 20330

AFIT/LS
Wright Patterson AFB, OH 45433

AUL
Maxwell AFB, AL 36112

AFHRL/LRS-TDC
Wright Patterson AFB, OH 45433

AFCOLR/CC
Wright Patterson AFB, OH 45433

AFBRMC/CC
Wright Patterson AFB, OH 45433

AFALD/XR
Wright Patterson AFB, OH 45433

AFDSDC/LGS
Gunter AFS, AL 36114

AFLMC/XRS
2 copies & original report

AFLMC Library
5 copies minimum

AFLMC/LGS
1 cy for directorate library

END

FILMED

1-85

DTIC